

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please cancel Claims 4, 16, 23, 28, 33, and 37.

4 Please amend Claims 1-3, 5-12, 14, 15, 17, 18, 20, 21, 24-27, 29, 30, 32, 34-36, 38-43, and
5 46-52 as follows:

6 1. (Currently Amended) A device comprising:

7 a sensor based on a regenerative surface air sampler, the sensor comprising:

8 a regenerable collection surface configured to collect particles from the air;

9 a surface regenerator configured to remove particles from the regenerable collection
10 surface, such that once regenerated, the regenerable collection surface can collect additional particles
11 from the air, and such that particles collected before regeneration of the regenerable collection
12 surface are substantially no longer present to contaminate particles collected after the regeneration;
13 and

14 an analyzer for evaluating the particles collected on the regenerable collection surface;

15 and

16 a communication interface coupled to the sensor.

17 2. (Currently Amended) The device according to ~~claim 4~~ Claim 1, wherein the sensor is
18 selected from the group consisting of biological, chemical, and radiological sensors.

19 3. (Currently Amended) The device according to ~~claim 4~~ Claim 1, wherein the
20 communication interface is selected from the group consisting of a transmitter, a transceiver, and
21 an interface that is configured to communicate over an automation system network.

22 4. (Canceled)

23 5. (Currently Amended) The device according to ~~claim 4~~ Claim 1, wherein the regenerable
24 collection surface is part of an impaction plate.

25 6. (Currently Amended) The device according to ~~claim 4~~ Claim 1, wherein the sensor further
26 comprises a spotting nozzle configured to direct an air stream towards the regenerable collection
27 surface, such that the resulting impact of the air stream with the regenerable collection surface
28 generates a spot of particles on the regenerable collection surface.

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1 7. (Currently Amended) The device according to ~~claim 4~~ Claim 1, wherein the surface
2 regenerator comprises at least one element selected from the group consisting essentially of:

3 a brush that regenerates the regenerable collection surface by brushing away particles that
4 were collected on the regenerable collection surface;

5 a pad that regenerates the regenerable surface by pressing against the regenerable collection
6 surface while there is movement between the pad and the regenerable collection surface relative to
7 each other, so as to remove particles that were collected on the regenerable collection surface; and

8 a wheel coupled to a motor that regenerates the regenerable collection surface by pressing
9 against the regenerable collection surface while the motor rotates the wheel, so as to remove particles
10 that were collected on the regenerable collection surface.

11 8. (Currently Amended) The device according to ~~claim 1~~ Claim 1, further comprising a
12 battery backup power supply.

13 9. (Currently Amended) The device according to ~~claim 1~~, Claim 1, further comprising a
14 building, such that the device is incorporated into the building.

15 10. (Currently Amended) The device according to ~~claim 1~~ Claim 1, further comprising an
16 aircraft, such that the device is incorporated into the aircraft.

17 11. (Currently Amended) The device according to ~~claim 1~~, Claim 1, wherein the sensor is
18 capable to output a positive response to the communication interface; and further comprising an air
19 sampler coupled to the communication interface, wherein the air sampler can be activated by the
20 positive response capture at least one sample of airborne particles.

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1 12. (Currently Amended) The device of ~~claim 4~~ Claim 1, wherein the surface regenerator
2 comprises at least one element selected from the group consisting essentially of:

3 a nozzle configured to direct high velocity air towards the regenerable collection surface to
4 dislodge particles deposited thereon;

5 a blade configured to scrape the regenerable collection surface to dislodge particles deposited
6 thereon;

7 means for electrostatically charging the collection surface, so that a static charge disperses the
8 particles that were deposited thereon;

9 means for directing energy to the particles collected upon the regenerable collection surface to
10 dislodge particles deposited thereon; and

11 means for directing energy to the regenerable collection surface to dislodge particles
12 deposited thereon.

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1 13. (Previously Presented) An air monitoring system comprising:
2 a sensor that includes:

3 a regenerable collection surface configured to collect particles from the air, to provide
4 sample particles;

5 a surface regenerator configured to remove particles from the collection surface, such
6 that once regenerated, the regenerable collection surface can collect additional particles from the air,
7 particles that were collected before regeneration of the regenerable collection surface being
8 substantially removed by the surface regenerator to avoid contaminating particles collected after the
9 regeneration; and

10 an analyzer configured to determine characteristics of the particles collected on the
11 regenerable collection surface;

12 a communication interface configured to enable the air monitoring system to be coupled to a
13 network; and

14 a controller coupled to the sensor, the controller being configured to cyclically implement a
15 plurality of functions, including:

16 directing airborne particles so that they are deposited on the regenerable collection
17 surface to form a spot;

18 analyzing the particles forming the spot;

19 transmitting a signal over the communication interface when the analysis indicates the
20 particles represent a potential threat; and

21 activating the surface regenerator to regenerate the regenerable collection surface after
22 the particles have been analyzed.

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- 1 14. (Currently Amended) An air monitoring system comprising:
2 a sensor based on a regenerative surface air sampler, the sensor comprising:
3 a regenerable collection surface configured to collect particles from the air;
4 a surface regenerator configured to remove particles from the regenerable collection
5 surface, such that once regenerated, the regenerable collection surface can collect additional particles
6 from the air, and such that particles collected before regeneration of the regenerable collection
7 surface are substantially no longer present on the regenerable collection surface to contaminate
8 particles collected after the regenerable collection surface is regenerated; and
9 an analyzer for evaluating the particles collected on the regenerable collection surface,
10 in order to determine if the collected particles represent a potential threat; and
11 a controller communicatively coupled to the sensor, the controller being configured to
12 selectively actuate the surface regenerator to regenerate the regenerable collection surface.
13 15. (Currently Amended) The system according to ~~claim 14~~ Claim 14, wherein the sensor is
14 selected from the group consisting of dumb sensors, smart sensors, and intelligent sensors.
15 16. (Canceled)
16 17. (Currently Amended) The system according to ~~claim 14~~ Claim 14, wherein the controller
17 is ~~capable of actuating~~ configured to actuate at least one other component in response to information
18 received from the sensor.
19 18. (Currently Amended) The system according to ~~claim 14~~ Claim 14, wherein the system is
20 associated with air management equipment.
21 19. (Canceled)

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1 20. (Currently Amended) A network comprising:
2 a sensor based on a regenerative surface air sampler, the sensor comprising:
3 a regenerable collection surface configured to collect particles from the air;
4 a surface regenerator configured to remove particles from the regenerable collection
5 surface, such that once thus regenerated, the regenerable collection surface can collect additional
6 particles from the air, and such that particles collected before regeneration of the regenerable
7 collection surface are substantially no longer present on the regenerable collection surface to
8 contaminate particles collected after the regeneration; and
9 means for collecting data corresponding to the particles collected on the regenerable
10 collection surface;
11 a transceiver for communicating over an automation system network;
12 at least one actuator;
13 an air management component coupled to the actuator; and
14 a controller communicatively coupled to the sensor, the transceiver, and the actuator, the
15 controller being configured to implement a plurality of functions, including:
16 analyzing particles collected on the regenerable collection surface using data collected
17 by the sensor;
18 transmitting a signal to the automation system network using the transceiver when the
19 analysis indicates the particles represent a potential threat; and
20 activating the surface regenerator to regenerate the regenerable collection surface after
21 the particles have been analyzed.

22 21. (Currently Amended) The network according to ~~claim 20~~ Claim 20, wherein the
23 controller actuates the air management component based on information received from the sensor.

24 22. (Canceled)

25 23. (Canceled)

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1 24. (Currently Amended) The network according to ~~claim 23~~ Claim 20, wherein the surface
2 regenerator comprises at least one element selected from the group consisting essentially of:

3 a brush that regenerates the regenerable collection surface by brushing away particles that
4 were collected on the regenerable collection surface;

5 a pad that regenerates the regenerable surface by pressing against the regenerable collection
6 surface while there is relative movement between the pad and the regenerable collection surface, so
7 as to remove particles that were collected on the regenerable collection surface; and

8 a wheel coupled to a motor that regenerates the regenerable collection surface by pressing
9 against the regenerable collection surface while the motor rotates the wheel, so as to remove particles
10 that were collected on the regenerable collection surface.

11 25. (Currently Amended) The network according to ~~claim 20~~ Claim 20, wherein the air
12 management component is selected from the group consisting of a sample capture device, a sample
13 analysis device, an air duct damper, and a particle counter.

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1 26. (Currently Amended) A system comprising:
2 a sensor based on a regenerative surface air sampler, the sensor comprising:
3 a regenerable collection surface configured to collect particles from the air;
4 a surface regenerator configured to remove particles from the regenerable collection
5 surface, such that once regenerated, the regenerable collection surface can collect additional particles
6 from the air, and such that particles collected before regeneration of the regenerable collection
7 surface are substantially no longer present on the regenerable collection surface to contaminate
8 particles collected after regeneration of the regenerable collection surface; and
9 an analyzer configured to collect data corresponding to the particles collected on the
10 regenerable collection surface;
11 a transceiver for communicating over an automation system network; and
12 a controller communicatively coupled to the sensor and the transceiver, the controller being
13 configured to implement a plurality of functions, including:
14 analyzing data collected by the sensor corresponding to the particles collected on the
15 regenerable collection surface to determine if the particles represent a potential threat;
16 transmitting a signal to the automation system network using the transceiver when the
17 analysis indicates the particles represent a potential threat; and
18 activating the surface regenerator to regenerate the regenerable collection surface after
19 the particles have been analyzed.

20 27. (Currently Amended) The system according to ~~claim 26~~ Claim 26, wherein the controller
21 communicates via at least one technique selected from the group consisting of a BACnet protocol, a
22 wireless communication, an RF link to an RF link network, and a wired link.

23 28. (Canceled)

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1 29. (Currently Amended) The system according to ~~claim 28~~ Claim 26, wherein the surface
2 regenerator comprises at least one element selected from the group consisting essentially of:

3 a brush that regenerates the regenerable collection surface by brushing away particles that
4 were collected on the regenerable collection surface;

5 a pad that regenerates the regenerable collection surface by pressing against the regenerable
6 collection surface while the pad and the regenerable collection surface move relative to each other, so
7 as to remove particles that were collected on the regenerable collection surface; and

8 a wheel coupled to a motor for regenerating the regenerable collection surface by pressing
9 against the regenerable collection surface while the motor rotates the wheel, so as to remove particles
10 that were collected on the regenerable collection surface.

11 30. (Currently Amended) The system according to ~~claim 28~~ Claim 26, wherein the sensor
12 further comprises a mechanically-based homing sensor that positions the regenerable collection
13 surface relative to a specific component, the specific component comprising at least one component
14 selected from the group consisting essentially of:

15 a spotting nozzle configured to deposit a spot of particles on the regenerable collection
16 surface;

17 [[an]] the analyzer;

18 the surface regenerator; and

19 a liquid coating applicator used to apply a liquid to the regenerable collection surface.

20 31. (Canceled)

21 32. (Currently Amended) A method of constructing a network of sensors, the method
22 comprising adding a sensor based on a regenerative surface air sampler to the network, wherein the
23 sensor comprises:

24 a regenerable collection surface configured to collect particles from the air; and

25 a surface regenerator configured to remove particles from the regenerable collection surface,
26 such that once the regenerable collection surface is regenerated, the regenerable collection surface
27 can collect additional particles from the air, and such that particles collected before regeneration of
28 the regenerable collection surface are substantially no longer present on the regenerable collection
29 surface to contaminate particles collected after the regeneration of the regenerable collection surface.

30 33. (Canceled)

1 34. (Currently Amended) The method according to ~~claim 32~~ Claim 32, where the network
2 comprises a smoke or fire sensor.

3 35. (Currently Amended) A method of controlling ambient air quality, the method
4 comprising:

5 sampling ambient air with at least one sensor based on a regenerative surface air sampler, the
6 sensor comprising:

7 a regenerable collection surface configured to collect particles from the air;

8 a surface regenerator configured to remove particles from the regenerable collection
9 surface, such that once regenerated, the regenerable collection surface can collect additional particles
10 from the air, and such that particles collected before regeneration of the regenerable collection
11 surface are substantially no longer present to contaminate particles collected after the regeneration of
12 the regenerable collection surface; and

13 means for determining if the particles collected on the regenerable collection surface
14 represent a potential threat to air quality; and

15 upon receiving an indication of a probable threat from the sensor, performing a responsive
16 step.

17 36. (Currently Amended) The method according to ~~claim 35~~ Claim 35, wherein the
18 responsive step comprises at least one step selected from the group consisting essentially of actuating
19 an air management component, activating at least one sampler specific sensor, issuing [[an]] a
20 warning signal, and transmitting an alert signal to facility management[[]].

21 37. (Canceled)

22 38. (Currently Amended) The method according to ~~claim 37~~ Claim 35, further comprising
23 the step of analyzing particles on the regenerable collection surface to determine whether or not an
24 indication of a probable threat exists.

25 39. (Currently Amended) The method according to ~~claim 38~~ Claim 38, wherein after the step
26 of analyzing the particles, further comprising the step of activating the surface regenerator to remove
27 particles from the regenerable collection surface, such that once regenerated, the regenerable
28 collection surface can collect additional particles from the air, and such that particles collected before
29 regeneration of the regenerable surface are substantially no longer present to contaminate particles
30 collected after the regeneration.

1 40. (Currently Amended) The method according to ~~claim 35~~ Claim 35, wherein the
2 responsive step comprises the step of transmitting an alert signal to a fire department or law
3 enforcement agency.

4 41. (Currently Amended) The device of ~~claim 4~~ Claim 1, wherein the sensor further
5 comprises at least one element selected from the group consisting of:

6 a particle concentrator configured to increase a concentration of airborne particles within a
7 desirable size range in an air stream from which the regenerable collection surface collects particles;
8 and

9 a size-selective inlet configured to precondition air from which particles are to be collected by
10 the regenerable collection surface by removing particles from the air that have a size greater than a
11 predefined size.

12 42. (Currently Amended) The device of ~~claim 4~~ Claim 1, wherein the sensor further
13 comprises a mechanically-based homing sensor that positions the regenerable collection surface
14 relative to a selected component, the selected component comprising at least one component selected
15 from the group consisting essentially of:

16 a spotting nozzle configured to deposit a spot of particles on the regenerable collection
17 surface;

18 [[an]] the analyzer;

19 the surface regenerator; and

20 a liquid coating applicator used to apply a liquid to the regenerable collection surface, to
21 moisten the regenerable collection surface prior to collecting the particles, thereby enhancing a
22 collection efficiency of the regenerable collection surface.

23 43. (Currently Amended) The device of ~~claim 4~~ Claim 1, wherein the sensor further
24 comprises[[:]]

25 ~~an analyzer configured to examine characteristics of the particles collected on the regenerable~~
26 ~~collection surface; and~~

27 a processor coupled to the analyzer, the processor being logically configured to determine a
28 concentration of biological particles collected on the regenerable collection surface, and to activate an
29 alarm signal when the processor determines that the concentration of biological particles collected on
30 the regenerable collection surface exceeds a predetermined value.

1 44. (Previously Presented) Apparatus configured to collect airborne particles, comprising:
2 a sensor based on a regenerative surface air sampler, the sensor comprising:
3 a regenerable collection surface configured to collect particles from the air; and
4 a surface regenerator configured to remove particles from the regenerable collection
5 surface, such that once regenerated, the regenerable collection surface can collect additional particles
6 from the air, and such that particles collected before regeneration of the regenerable collection surface
7 are substantially no longer present to contaminate particles collected after the regeneration; and
8 a communication interface coupled to the sensor.

9 45. (Previously Presented) A method for continuously monitoring airborne particles, the method
10 repetitively carrying out a plurality of cycles, each cycle comprising the steps of:
11 depositing particles that were airborne on a regenerable collection surface;
12 analyzing the particles that were deposited on the regenerable collection surface;
13 when analysis indicates that the particles deposited represent a potential threat, transmitting a
14 signal indicative of the potential threat over a network; and
15 regenerating the regenerable collection surface to substantially remove the particles that were
16 deposited thereon during a previous cycle.

17 46. (Currently Amended) The method of ~~claim 45~~ Claim 45, wherein the step of depositing
18 particles on the regenerable collection surface comprises the step of depositing the particles to form a
19 spot.

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1 47. (Currently Amended) The method of ~~claim 45~~ Claim 45, wherein the step of
2 regenerating the collection surface comprises at least one step selected from the group of steps
3 consisting essentially of:

4 brushing the regenerable collection surface, to dislodge the particles deposited on the
5 regenerable collection surface;

6 pressing a pad against the regenerable collection surface while there is relative motion
7 between the pad and the regenerable collection surface, to remove the particles deposited on the
8 regenerable collection surface;

9 pressing a wheel against the regenerable collection surface while there is relative motion
10 between the wheel and the regenerable collection surface, to remove the particles deposited on the
11 regenerable collection surface;

12 directing high velocity air towards the regenerable collection surface to dislodge the particles
13 deposited on the regenerable collection surface;

14 electrostatically charging the regenerable collection surface to electrostatically disperse the
15 particles deposited on the regenerable collection surface; and

16 directing energy to the particles collected upon the regenerable collection surface to dislodge
17 the particles deposited on the regenerable collection surface.

18 48. (Currently Amended) The method of ~~claim 45~~ Claim 45, further comprising the step of
19 verifying that the step of regenerating the regenerable collection surface has substantially removed
20 the particles that were previously deposited before starting to deposit particles on the regenerable
21 collection surface in a next cycle.

22 49. (Currently Amended) The method of ~~claim 48~~ Claim 48, wherein the step of analyzing
23 the particles that were deposited comprises measuring fluorescence properties of the deposited
24 particles, and the step of verifying that the step of regenerating the regenerable collection surface has
25 substantially removed the particles that were previously deposited comprises the steps of:

26 determining a background fluorescence level for the regenerated collection surface; and

27 comparing the background fluorescence level with predetermined criteria, such that if the
28 background fluorescence level does not substantially satisfy the predetermined criteria, the step of
29 regenerating is repeated before starting to deposit particles on the regenerable collection surface in a
30 next cycle, until the background fluorescence level substantially satisfies the predetermined criteria.

1 50. (Currently Amended) The method of ~~claim 45~~ Claim 45, wherein the step of analyzing
2 the particles that were deposited comprises at least one step selected from the group consisting of:

3 pre-treating the particles that were deposited by performing plasma lysing, adding a matrix
4 solution, and measuring a mass spectra of the particles that were deposited and pretreated, using mass
5 spectrometry; and

6 measuring an autofluorescence of any bio-molecules that may be present in the particles that
7 were deposited to obtain a biological signature of the particles, the biological signature being
8 obtained using the steps of:

9 determining an average value and a standard deviation based on previously obtained
10 estimates of the concentration of biological particles;

11 comparing the estimated concentration to the average value; and

12 transmitting the signal if the estimated concentration exceeds a sum of the average
13 value and a product of a predetermined factor and the standard deviation.

14 51. (Currently Amended) The method of ~~claim 45~~ Claim 45, wherein the method steps are
15 implemented by a plurality of sensors coupled together to form a network, to enable air monitoring
16 over a wider area than that monitored using a single sensor.

17 52. (Currently Amended) The method of ~~claim 45~~ Claim 45, wherein the step of transmitting
18 the signal indicative of the results over the network comprises at least one step selected from the
19 group of steps consisting essentially of:

20 activating an alarm signal directed to a designated party;

21 actuating an air management component;

22 producing a warning signal;

23 moving a damper in an air duct;

24 transmitting an alarm signal to a fire department;

25 transmitting an alarm signal to a law enforcement agency; and

26 transmitting an alarm signal to a management entity responsible for managing a facility.